OIPE

RAW SEQUENCE LISTING DATE: 03/19/2002
PATENT APPLICATION: **US/10/087,013** TIME: 16:16:07

Input Set : **A:\NIH176.001C1.TXT**
Output Set: **N:\CRF3\03192002\J087013.raw**

Does Not Comply
Corrected Diskette Needed

```
 4 <110> APPLICANT: Arthur Scherf
 5       Louis H. Miller
 6       Benoit Gamain
 7       Dror I. Baruch
 8       Pierre Buffet
 9       Christine Scheidig
10       Jurg Gysin
11       Bruno Pouvelle
12       Nobutaka Fujii
13       Joseph Smith
15 <120> TITLE OF INVENTION: IDENTIFICATION OF THE DOMAIN OF
16       PLASMODIUM FALCIPARUM ERYTHROCYTE MEMBRANE PROTEIN 1
17       (PFEMP1) THAT MEDIATES ADHESION TO CHONDROITIN SULFATE A
20 <130> FILE REFERENCE: NIH176.001C1
22 <140> CURRENT APPLICATION NUMBER: US/10/087,013
22 <141> CURRENT FILING DATE: 2002-02-21
22 <150> PRIOR APPLICATION NUMBER: PCT/US00/24195
23 <151> PRIOR FILING DATE: 2000-09-01
25 <150> PRIOR APPLICATION NUMBER: 60/152,023
26 <151> PRIOR FILING DATE: 1999-09-01
28 <160> NUMBER OF SEQ ID NOS: 11
30 <170> SOFTWARE: FastSEQ for Windows Version 4.0
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ERRORED SEQUENCES

pp 5, 10

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217 <210> SEQ ID NO: 2
218 <211> LENGTH: 3542
219 <212> TYPE: PRT
220 <213> ORGANISM: Plasmodium falciparum
222 <400> SEQUENCE: 2
223 Met Gly Phe Ser Cys Lys Tyr Phe Ile Ile Lys Met Gly Asn Ala Ala
224  1               5                  10                  15
225 Ser Ser Leu Glu Gly Asp Ala Lys Ser Pro Ile Ile Lys Glu Ser His
226             20                  25                  30
227 Lys Ser Ala Arg Asn Val Leu Glu Arg Tyr Ala Lys Asn Ile Arg His
228         35                  40                  45
229 Pro Ser Lys Tyr Ala Lys Glu His Val Asp Ser Leu Lys Gly Asp Leu
230     50                  55                  60
231 Thr Lys Ala Glu Phe Arg Gly Gly Pro Ser Thr Pro Val Asn Lys His
232 65                  70                  75                  80
233 Asn Tyr Tyr Tyr Pro Tyr Pro Cys Asn Leu Asp His Lys Glu His Thr
234                 85                  90                  95
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```
235 Asn Leu Arg Tyr Asp Asp Val Asn Leu Arg His Pro Cys His Gly Arg
236             100                 105                 110
237 Glu Gln Asn Arg Phe Asp Glu Asp Glu Glu Ser Glu Cys Gly Asn Lys
238         115                 120                 125
239 Ile Arg Asn Tyr Lys Arg Lys Asn Asp Ala Ile Ala Cys Ala Pro Pro
240     130                 135                 140
241 Arg Arg Arg His Met Cys Asp Lys Asn Leu Glu Ala Leu Asn Asp Ile
242 145                 150                 155                 160
243 Asn Thr Gln Asn Ile His Asp Leu Leu Gly Asn Val Leu Val Thr Ala
244                 165                 170                 175
245 Lys Tyr Glu Gly Glu Ser Ile Val Asn Asn His Pro His Lys Gly Thr
246             180                 185                 190
247 Ser Asp Ala Cys Thr Ala Leu Ala Arg Ser Phe Ala Asp Ile Gly Asp
248         195                 200                 205
249 Ile Val Arg Gly Ile Asp Met Phe Lys Pro Asn Val His Asp Lys Val
250     210                 215                 220
251 Glu Thr Gly Leu Arg Glu Val Phe Lys Lys Ile His Asp Gly Met Glu
252 225                 230                 235                 240
253 Asp Glu Val Lys Asn Asp Tyr Asn Pro Asp Gly Ser Gly Asn Tyr Tyr
254                 245                 250                 255
255 Lys Leu Arg Glu Ala Trp Trp Asn Val Asn Arg Asn Lys Val Trp Glu
256             260                 265                 270
257 Ala Ile Thr Cys Asp Ala Ser Tyr Lys Ser Gly Tyr Phe Met Gln Ser
258         275                 280                 285
259 Glu Ser Asn Thr Pro Leu Phe Ser Asn Pro Lys Cys Gly His Lys Gln
260     290                 295                 300
261 Gly Lys Val Pro Thr Asn Leu Asp Tyr Val Pro Gln Tyr Leu Arg Trp
262 305                 310                 315                 320
263 Phe Asp Glu Trp Gly Glu Glu Phe Cys Arg Lys Arg Asn Ile Lys Leu
264                 325                 330                 335
265 Lys Lys Val Lys Asp Ser Cys Arg Asn Asp Lys Glu Arg Leu Tyr Cys
266             340                 345                 350
267 Ser His Asn Gly His Asp Cys Thr Thr Thr Ile Trp Lys Lys Gly Ile
268         355                 360                 365
269 Leu His Leu Asp Asn Lys Cys Thr Asp Cys Ser Thr Lys Cys Lys Val
270     370                 375                 380
271 Phe Glu Val Trp Leu Gly Asn Gln Gln Glu Ala Phe Lys Lys Gln Lys
272 385                 390                 395                 400
273 Glu Lys Tyr Glu Lys Glu Ile Gln Ser Tyr Leu Ser Asn Asp Asn Lys
274                 405                 410                 415
275 Phe Val Asn Asn Ile Asn Ser Glu Tyr Tyr Lys Gln Phe Tyr Glu Lys
276             420                 425                 430
277 Leu Lys Glu Thr Gln Tyr Ala Thr Asn Asp Thr Phe Leu Asn Leu Leu
278         435                 440                 445
279 Asn Glu Gly Lys Tyr Cys Lys Gly Gly Leu Pro Gly Glu Lys Asp Ile
280     450                 455                 460
281 Thr Phe Thr Asn Ser Ala Asp Asp Lys Gly Ile Phe Tyr Arg Ser Glu
282 465                 470                 475                 480
283 Tyr Cys Gln Val Cys Pro Asp Cys Gly Val Lys Cys Asp Gly Ile Lys
```

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```
                485                 490                 495
Tyr Thr His Lys Ser Asp Asn Asp Arg Glu Arg Val Asn Asn Glu Asp
            500                 505                 510
Tyr Lys Pro Pro Trp Gly Val Lys Pro Thr Asn Ile Thr Val Leu Tyr
        515                 520                 525
Ser Gly Asn Glu Gln Gly Asp Ile Thr Gln Lys Leu Glu Asn Phe Cys
    530                 535                 540
Asn Ser Ser Thr Asn Tyr Lys Asp Lys Asn Asn Gln Lys Trp Glu Cys
545                 550                 555                 560
Tyr Tyr Lys Asp Glu Asn Ile Asn Arg Cys Lys Leu Glu Gln Asn Thr
                565                 570                 575
Glu Ile Asn Asn Asp Asn Pro Lys Ile Ile Ser Phe His Asn Phe Phe
            580                 585                 590
Glu Leu Trp Val Thr Tyr Leu Leu Arg Asp Thr Ile Lys Trp Asn Asp
        595                 600                 605
Lys Leu Lys Thr Cys Ile Asn Asn Thr Thr Thr His Cys Ile Asp Glu
    610                 615                 620
Cys Asn Arg Asn Cys Leu Cys Phe Asp Arg Trp Val Lys Gln Lys Glu
625                 630                 635                 640
Glu Glu Trp Asn Ser Ile Lys Lys Leu Phe Thr Lys Lys Lys Asn Ile
                645                 650                 655
Gln Gln Ser Tyr Tyr Ser Asn Ile Asn Asn Leu Phe Glu Gly Tyr Phe
            660                 665                 670
Phe Lys Val Met Asp Lys Leu Asp Lys Asp Glu Ala Lys Trp Lys Glu
        675                 680                 685
Leu Met Glu Asn Ile Lys Arg Lys Lys Asn Glu Phe Ser Asn Leu Glu
    690                 695                 700
Asn Asn Arg Asp Tyr Leu Glu Asn Ala Ile Glu Leu Leu Leu Asp His
705                 710                 715                 720
Leu Lys Glu Thr Ala Thr Ile Cys Lys Asp Asn Asn Thr Asn Glu Ala
                725                 730                 735
Cys Glu Thr Ser His Asn Ala Thr Thr Asn Pro Cys Val Lys Pro Arg
            740                 745                 750
Gly Gly Thr Gln Pro Thr Lys Asn Ile Lys Glu Ile Ala Gln Tyr Phe
        755                 760                 765
Lys Arg Ser Ala Tyr Glu Glu Ala Arg Asn Arg Gly Leu His Lys Leu
    770                 775                 780
Lys Gly Lys Ala His Glu Gly Ile Tyr Lys Arg Gly Gly Arg Arg Lys
785                 790                 795                 800
Asp Phe Lys Asp Asn Leu Cys Arg Ile Met Ile Lys His Ser Asn Arg
                805                 810                 815
Asn Leu Gly Phe Ser Asn Gly Pro Cys Asp Gly Lys Gly Thr Gly Asp
            820                 825                 830
Gly Ile Gln Thr Arg Phe Val Val Gly Thr Glu Trp Glu Val Asp Pro
        835                 840                 845
Glu His Met Arg Lys Asp His Glu Asp Val Ile Met Pro Pro Arg Arg
    850                 855                 860
Arg His Ile Cys Thr Ser Asn Leu Glu His Leu Gln Thr Asp Asp His
865                 870                 875                 880
```

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```
333 Pro Leu Asn Gly Asn Ile Val Asp Asp Leu Val Asn Asn Ser Phe Leu
334                 885                 890                 895
335 Gly Asp Val Leu Leu Ser Ala Lys Tyr Glu Ala Asn Lys Ile Ile Arg
336             900                 905                 910
337 Met Tyr Lys Glu Lys Asn Asn Leu Lys Gly Pro Lys Glu Val Thr Asp
338         915                 920                 925
339 Pro Lys His Gln Thr Thr Ile Cys Arg Ala Ile Arg Tyr Ser Phe Ala
340     930                 935                 940
341 Asp Ile Gly Asp Ile Ile Arg Gly Arg Asp Leu Trp Glu Arg Asn Gly
342 945                 950                 955                 960
343 Asp Met Val Lys Leu Gln Gly His Leu Glu Thr Val Phe Gly Asn Ile
344                 965                 970                 975
345 His Lys Ser Leu Lys Gly Lys Gly Asn Asp Lys Tyr Asn Asp Asp Ala
346             980                 985                 990
347 Pro Lys Tyr Leu Lys Leu Arg Glu Asn Trp Trp Glu Ala Asn Arg Ala
348         995                 1000                1005
349 Lys Val Trp Glu Ala Met Lys Cys Asp Ile Lys Tyr Leu Lys Asp Lys
350     1010                1015                1020
351 Ser Gly His Gln Ser Thr Gln Ser Ser Tyr Cys Gly Tyr Ser Asp His
352 1025                1030                1035                1040
353 Thr Pro Leu Asp Asp Tyr Ile Pro Gln Lys Leu Arg Trp Met Thr Glu
354                 1045                1050                1055
355 Trp Ala Glu Trp Tyr Cys Lys Val Gln Lys Lys Glu Tyr Asp Lys Leu
356             1060                1065                1070
357 Lys Glu Lys Cys Lys Glu Cys Lys Asp Lys Asp Asn Gly Gln Gly Cys
358         1075                1080                1085
359 Thr Lys Glu Ser Gly Thr Gly Cys Thr Lys Cys Thr Glu Ala Cys Asn
360     1090                1095                1100
361 Glu Tyr Asn Asp Ile Ile Gly Leu Trp Lys Glu Gln Trp Asn Ile Ile
362 1105                1110                1115                1120
363 Ser Asp Lys Tyr Lys Glu Leu His Glu Gln Ala Gln Met Ser Val Ser
364                 1125                1130                1135
365 Asn Ser Gly Ile Glu Ala Ser Ser Thr Ala Lys Asn His Ile Asp Arg
366             1140                1145                1150
367 Asn Val Ile Glu Phe Leu Ser Glu Leu Tyr Gln Gln Asn Gly Gly Lys
368         1155                1160                1165
369 Ser Asn Lys Ser Gly Thr Ser Asp Glu Ser Ala Val Ile Gly Thr Asn
370     1170                1175                1180
371 Thr Thr Tyr Glu Asn Val Gly Ala Tyr Leu His Asp Thr Gly Asn Phe
372 1185                1190                1195                1200
373 Asp Asp Cys Gln Ser Gln Asn Glu Phe Cys Asp Glu Lys Ser Asp Gly
374                 1205                1210                1215
375 Lys Asp Asn Glu Lys Tyr Ala Phe Arg Asp Lys Pro Gln Asp His Asp
376             1220                1225                1230
377 Gly Ala Cys Gly Cys Lys Ser Gly Ser Lys Pro Thr Arg Val Gln Ile
378         1235                1240                1245
379 Lys Thr Lys Lys Lys Ala Glu Glu Lys Asp Thr Glu Cys Lys Thr Val
380     1250                1255                1260
381 Asn Asp Ile Leu Lys Glu Asn Asp Gly Lys Lys Gln Val Glu Asp Cys
```

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```
382 1265                1270                1275                1280
383 His Pro Lys Lys Asn Ser Asn Gly Tyr Pro Asp Trp Gln Cys Gly Asn
384                 1285                1290                1295
385 Ile Asn Leu Val Glu Asp Pro Arg Val Cys Met Pro Pro Arg Arg Gln
386             1300                1305                1310
387 Lys Leu Cys Val His Phe Leu Ala Asn Asp Asn Glu Ile Lys Lys Leu
388         1315                1320                1325
389 Gln Ser Gln Val Asn Leu Lys Glu Ala Phe Ile Lys Ser Ala Ala Ala
390     1330                1335                1340
391 Glu Thr Phe Phe Ser Trp Tyr Tyr Tyr Lys Ser Lys Asp Gly Glu Gly
392 1345                1350                1355                1360
393 Asn Glu Leu Asp Lys Glu Leu Lys Glu Gly Lys Ile Pro Pro Ala Phe
394                 1365                1370                1375
395 Leu Arg Ser Met Phe Tyr Thr Phe Gly Asp Tyr Arg Asp Phe Leu Phe
396             1380                1385                1390
397 Gly Thr Asp Ile Ser Lys Gly His Gly Glu Gly Ser Lys Leu Lys Glu
398         1395                1400                1405
399 Gln Ile Asp Ser Leu Phe Lys Asn Gly Asp Gln Lys Ser Pro Asn Gly
400     1410                1415                1420
E--> 401 Lys Thr Arg Gln Glu Trp Trp Thr Glu His Ser His Glu Ile Trp Glu
402 1425                1430                1435                1440
403 Ala Met Leu Cys Ala Leu Val Lys Ile Gly Ala Lys Lys Asp Asp Phe
404                 1445                1450                1455
405 Thr Glu Asn Tyr Gly Tyr Asn Asn Val Lys Phe Ser Asp Lys Ser Thr
406             1460                1465                1470
407 Thr Leu Glu Glu Phe Ala Lys Arg Pro Gln Phe Leu Arg Trp Leu Thr
408         1475                1480                1485
409 Glu Trp Tyr Asp Asp Tyr Cys Tyr Thr Arg Gln Lys Tyr Leu Lys Asp
410     1490                1495                1500
411 Val Gln Glu Lys Cys Lys Ser Asn Asp Gln Leu Lys Cys Asp Thr Glu
412 1505                1510                1515                1520
413 Cys Asn Lys Lys Cys Glu Asp Tyr Val Lys Tyr Met Lys Lys Lys Lys
414                 1525                1530                1535
415 Glu Trp Ile Pro Gln Asp Lys Tyr Tyr Lys Asp Glu Arg Asp Lys Lys
416             1540                1545                1550
417 Arg Phe Asp Arg Gln His Ile Gly Val Met Val Thr Asp Tyr Thr Gly
418         1555                1560                1565
419 Thr Asn Ala Thr Asp Tyr Leu Asn Arg Lys Phe Thr Ala Ser Cys Gly
420     1570                1575                1580
421 Asp Lys Pro Gly Ser Ala Ser Val Val Gln Arg Asn Ile Gln Leu Leu
422 1585                1590                1595                1600
423 Glu Lys Gln Ala Tyr Tyr Asp Ala Asp Lys His Cys Gly Cys Thr Lys
424                 1605                1610                1615
425 Phe Ile Glu Asn Asp Asp Lys Tyr Thr Asn Ile Ser Ser Lys Asp Lys
426             1620                1625                1630
427 Cys Lys Gly Leu Val Lys Glu Ala Asn Thr Gly Ala Ile Lys Trp Gln
428         1635                1640                1645
429 Asn Lys Gly Pro Asn Asn Tyr Asn Asn Leu Lys Glu Leu Thr Glu Asp
430     1650                1655                1660
```

move over

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```
431 Val Leu Phe Pro Ser Arg Arg Leu Arg Ile Cys Phe His Ala Leu Asp
432 1665                1670                1675                1680
433 Gly Asn Tyr Thr Asp Pro Glu Val Lys Asp Glu Asn Gly Leu Arg Lys
434                 1685                1690                1695
435 Arg Leu Met Glu Val Ala Ala Thr Glu Gly Tyr Asn Leu Gly Gln Tyr
436             1700                1705                1710
437 Tyr Lys Glu Lys Lys Glu Lys Glu Lys Ile Lys Thr Ser Asp Ala His
438         1715                1720                1725
439 Lys Tyr Ser Tyr Glu Val Pro Pro Cys Ser Ala Met Lys Tyr Ser Phe
440     1730                1735                1740
441 Tyr Asp Leu Arg Asp Ile Ile Leu Gly Ile Asp Asn Leu Glu Asp Glu
442 1745                1750                1755                1760
443 Lys Gln Lys Thr Glu Glu Asn Leu Lys Lys Ile Phe Asn Lys Asn Gly
444                 1765                1770                1775
445 Thr Ser Val Gly Lys Gly Ser Asp Ser Thr Thr Gly Asn Pro Gly Ser
446             1780                1785                1790
447 Thr Ala Arg Lys Phe Phe Trp Asn Glu Asn Lys Glu Cys Val Trp Asn
448         1795                1800                1805
449 Ala Met Ile Cys Gly Tyr Lys Arg Gly Arg Asp Asp Gly Asn Ser Gly
450     1810                1815                1820
451 Asn Ser Ala Arg Ser Asp Glu Asp Leu Lys Lys Cys Gly Ser Val Pro
452 1825                1830                1835                1840
453 Ser Asp Asp Asp Tyr Pro Met Gly Lys Asn Arg Asp Glu Gly Thr Ala
454                 1845                1850                1855
455 Tyr Gln Phe Leu Arg Trp Phe Ala Glu Trp Gly Glu Asp Phe Cys Lys
456             1860                1865                1870
457 His Lys Glu Lys Glu Leu Glu Lys Leu Val Gly Ala Cys Asn Asp Tyr
458         1875                1880                1885
459 Thr Cys Gly Asp Asn Glu Asp Lys Arg Lys Lys Cys Thr Asp Ala Cys
460     1890                1895                1900
461 Thr Gln Tyr Lys Lys Phe Ile Ser Glu Trp Lys Pro Gln Tyr Glu Lys
462 1905                1910                1915                1920
463 Gln Ile Lys Lys Tyr Gly Glu Asn Lys Asp Lys Ile Tyr Ser Glu His
464                 1925                1930                1935
465 Pro Val Ala Lys Asp Ala Glu Asp Ala Arg Glu Tyr Leu Asp Lys Gln
466             1940                1945                1950
467 Leu Lys Lys Ile Cys Glu Asn Lys Ser Gly Asp Cys Glu Tyr Lys Cys
468         1955                1960                1965
469 Met Lys Asp Val Ser Thr Gln Arg Leu Thr Asp Gly Asn Ser Gln Asn
470     1970                1975                1980
471 Met Pro Ala Ser Leu Asp Asp Glu Pro Lys Glu Val Glu Gly Lys Cys
472 1985                1990                1995                2000
473 Asn Cys Gln Val Pro Arg Gly Pro Pro Arg Val Arg Arg Glu Thr Pro
474                 2005                2010                2015
475 Ser Pro Arg Val Ser Leu Ile Ser Lys Ala Thr Ala Ser Lys Lys Glu
476             2020                2025                2030
477 Ala Lys Thr Ala Pro Pro Thr Lys Gln Pro Lys Lys Val Glu Asn Leu
478         2035                2040                2045
479 Thr Thr Glu Met Arg Ala Gln Thr Arg Thr Arg Arg Ala Ala Gln Gln
```

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```
480     2050                2055                2060
481 Thr Arg Lys Arg Thr Ser Thr Ala Thr Thr Thr Glu Ser Asp Val Gly
482 2065                2070                2075                2080
483 Thr Met Val Lys Ala Ile Leu Ser Asn Lys Pro Asp Ser Arg Gly Gly
484                 2085                2090                2095
485 Ile Glu Gly Cys Asn Pro Lys Thr Tyr Gly Gln Tyr Pro Lys Trp Gly
486             2100                2105                2110
487 Cys Ile Val Gly Lys Ser Lys Glu Asn Glu Asn Gly Ile Cys Met Pro
488         2115                2120                2125
489 Pro Arg Arg Lys Lys Leu Cys Ile Asn Asn Ile Gln Tyr Leu Asn Tyr
490     2130                2135                2140
491 Glu Thr Glu Asn Lys Arg Asp Asn Asp Ile Lys Glu Ala Phe Ile Lys
492 2145                2150                2155                2160
493 Cys Ala Ala Ile Glu Thr Gln Phe Leu Trp Leu Lys Tyr Ile Ile Glu
494                 2165                2170                2175
495 Asn Pro Ala Ala Glu Asn Glu Leu Gln Asn Gly Thr Ile Pro Asp Glu
496             2180                2185                2190
497 Phe Lys Arg Ile Met Tyr Tyr Thr Tyr Gly Asp Tyr Lys Asp Met Phe
498         2195                2200                2205
499 Phe Gly Thr Asp Ile Ser Asn Asp Lys Lys Ile Ile Thr Val Thr Asn
500     2210                2215                2220
501 Ser Val Thr Thr Ile Leu Asn Glu Asn Asn Lys Lys Lys Gln Asp Lys
502 2225                2230                2235                2240
503 Lys Lys Asp Glu Glu Leu Arg Lys Ile Phe Trp Glu Lys Asn Lys Lys
504                 2245                2250                2255
505 Phe Ile Trp Glu Gly Met Ile Tyr Gly Leu Thr Tyr His Leu Thr Asp
506             2260                2265                2270
507 Glu Asn Glu Lys Glu Lys Ile Arg Asp Asn Tyr Gln Tyr Asn Asp Met
508         2275                2280                2285
509 Thr Lys Leu Thr Pro Ser Leu Glu Glu Phe Val Lys Arg Pro Gln Phe
510     2290                2295                2300
511 Leu Arg Trp Phe Thr Glu Trp Ala Glu Glu Phe Cys Asn Lys Arg Lys
512 2305                2310                2315                2320
513 Glu Gln Leu Leu Lys Leu Glu Ala Gly Cys Lys Glu Tyr Glu Cys Asn
514                 2325                2330                2335
515 Gly Ser Asn Asp Gly Lys Thr Gln Glu Cys Ala Glu Ala Cys Val Thr
516             2340                2345                2350
517 Tyr Gln Asn Phe Ile Lys Lys Trp Lys Thr Glu Tyr Glu Arg Gln Arg
518         2355                2360                2365
519 Glu Lys Phe Lys Lys Asp Lys Asp Gly Lys Lys Tyr Lys Asp Tyr Pro
520     2370                2375                2380
521 Ser Thr Glu Arg Asp Ile Glu Lys Ala Thr Cys Ala His Glu Tyr Leu
522 2385                2390                2395                2400
523 Asn Met Lys Leu Lys Glu Leu Cys Gly Asn Lys Asp Cys Ser Cys Met
524                 2405                2410                2415
525 Gln Lys Pro Ser Ser Gln Leu Pro Lys Thr Thr Gln Gln Ser Gln Ser
526             2420                2425                2430
527 Ser Asp Ala Asn Asp Met Pro Glu Ser Leu Asp Tyr Val Pro Glu Glu
528         2435                2440                2445
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```
529 Phe Asn Lys Cys Glu Cys Pro Glu Leu Ser Lys Lys Gly Ser Met Ile
530     2450                2455                2460
531 His Thr Lys Lys Ile Thr Glu Pro Lys Ile Pro Met Asn Cys Val Glu
532 2465                2470                2475                2480
533 Lys Ala Ala Tyr Tyr Leu Ser Lys Glu Ala Glu Asn Asn Met Asp Ile
534                 2485                2490                2495
535 Thr Leu Lys Glu Lys Phe Ile Pro Ile Glu Ser Thr Lys Glu Lys Glu
536             2500                2505                2510
537 Ser Lys Asn Ser Trp Thr Asn Asn Asn Pro Cys Asp Pro Lys Lys Pro
538         2515                2520                2525
539 Tyr Ala Pro Asp Lys Tyr Ile Gly Arg Arg Asn Pro Cys Glu Asn Arg
540     2530                2535                2540
541 Glu Glu Asn Arg Phe Lys Val Asp Tyr Glu Trp Lys Cys Tyr Lys Asn
542 2545                2550                2555                2560
543 Ser Lys Phe Tyr Gln Glu Lys Lys Arg Val Cys Val Pro Pro Arg Arg
544                 2565                2570                2575
545 Glu His Met Cys Leu Arg Asn Leu Asp Glu Ile Lys Ile Glu Arg Leu
546             2580                2585                2590
547 Lys Asp Ser Asn Tyr Leu Leu Lys Met Val Arg Arg Thr Ala Arg Asn
548         2595                2600                2605
549 Glu Gly Ile Asp Ile Ile Lys Asn Phe Asn Ser Glu Asn Gly Cys Ala
550     2610                2615                2620
551 Met Asn Pro Ile Cys Asp Thr Met Lys Tyr Ser Phe Ala Asp Leu Gly
552 2625                2630                2635                2640
553 Asp Ile Val Arg Gly Thr Asp Met Leu Arg Ile Gly Gly Tyr Leu Pro
554                 2645                2650                2655
555 Pro Val Glu Ile Lys Leu Tyr Lys Val Phe Glu Tyr Ile Tyr Gly Lys
556             2660                2665                2670
557 Trp Arg Asn Lys Asn Lys Gly Arg Asn Lys Tyr Asn Asp Val Gln Thr
558         2675                2680                2685
559 Phe Arg Ser Ala Trp Trp Asp Ala Asn Arg Lys Asp Ile Trp Lys Ala
560     2690                2695                2700
561 Met Thr Cys Lys Ala Pro Glu Asp Ala Lys Leu Phe Arg Lys Gly Arg
562 2705                2710                2715                2720
563 Met Asp Gly Phe Glu Arg Ile Thr Leu Ile Gln Asp Lys Cys Gly His
564                 2725                2730                2735
565 Lys Asp Asp Pro Pro Val Asp Asp Tyr Ile Pro Gln Arg Phe Arg Trp
566             2740                2745                2750
567 Met Thr Glu Trp Ser Glu Tyr Tyr Cys Lys Ala Leu Met Glu Glu Leu
568         2755                2760                2765
569 Glu Lys Phe Lys Lys Ser Cys Asp His Cys Lys Thr Ser Asp Arg Cys
570     2770                2775                2780
571 Lys Asn Asp Tyr Asp Glu Asn Lys Cys Glu Gln Cys Lys Thr Arg Cys
572 2785                2790                2795                2800
573 Gln Glu Tyr Lys Asn Phe Val Leu Lys Trp Lys Ser Leu Phe Asp Ile
574                 2805                2810                2815
575 Gln Ser Asn Lys Tyr Lys Glu Leu Tyr Glu Gln Pro Ile Tyr Thr Lys
576             2820                2825                2830
577 Ile Ser Thr Tyr Asp His Val Gln Asn Phe Val Gln Lys Leu Lys Thr
```

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```
578         2835                2840                2845
579 Phe Lys Ser Glu Cys Ser Val Glu Ser Phe Ser Glu Tyr Leu His Glu
580     2850                2855                2860
581 Thr Ser Lys Cys Leu Asn Tyr Lys Phe Asn Glu Asn Asp Gly Ser Ser
582 2865                2870                2875                2880
583 Asn Ile Arg Thr Tyr Ala Phe Glu Glu Thr Pro Lys Ser Tyr Lys Glu
584                 2885                2890                2895
585 Ala Cys Ser Cys Thr Leu Pro Ser Lys Asn Pro Leu Asp Asn Cys Pro
586             2900                2905                2910
587 Thr Asp Gln Asn Lys Asp Gly Cys Lys Glu Leu Gln Thr Phe Thr Phe
588         2915                2920                2925
589 Cys Ser Lys Asn Asp Tyr Asp Asn Asn Leu Asp Asn Trp Asn Ala Tyr
590     2930                2935                2940
591 Leu Val Leu Asn Ser Ser Asp Asp Asn Lys Gly Val Leu Ile Pro Pro
592 2945                2950                2955                2960
593 Arg Arg Arg His Leu Cys Thr Arg Pro Ile Thr Ala Tyr Asn Tyr Arg
594                 2965                2970                2975
595 Lys Gly Asp Lys Glu Ile Leu Lys Lys Lys Leu Leu Thr Ser Ala Phe
596             2980                2985                2990
597 Ser Gln Gly Gln Leu Leu Gly Gln Lys Tyr Lys Ser Glu Glu Glu Leu
598         2995                3000                3005
599 Cys Phe Glu Ala Met Lys Tyr Ser Tyr Ala Asp Tyr Ser Asp Ile Ile
600     3010                3015                3020
601 Lys Gly Thr Asp Met Met Asp Thr Ser Leu Ser Glu Lys Ile Lys Lys
602 3025                3030                3035                3040
603 Ile Phe Glu Thr Ser Asn Glu Ala Thr Glu Asn Arg Lys Thr Trp Trp
604                 3045                3050                3055
605 Glu Asn Asn Arg Arg Gln Ile Trp His Ala Met Leu Cys Gly Tyr Lys
606             3060                3065                3070
607 Ile Ala Thr Ser Lys Val Thr Leu Asp Glu Gly Trp Cys Gln Leu Pro
608         3075                3080                3085
609 Lys Asp Glu Glu Thr Asn Gln Phe Leu Arg Trp Leu Ile Glu Trp Ala
610     3090                3095                3100
611 Lys Gln Ala Cys Lys Glu Lys Lys His Val Ser Asp Ser Leu Lys Thr
612 3105                3110                3115                3120
613 Lys Cys Pro Arg Ser Asn Glu Asp Asn Phe Glu Ala Ser Glu Leu Leu
614                 3125                3130                3135
615 Arg Gln Pro Gly Cys Gln Asn Asp Ile Arg Lys Tyr Ile Ser Leu Asn
616             3140                3145                3150
617 Ile Leu Ile Lys Asn Thr Met Glu Asn Leu Asn Ile Lys Tyr Lys Gln
618         3155                3160                3165
619 Leu Lys Asp Gln Ser Ser Gly Asn Ile Asp Asn Lys Pro Ser Glu Glu
620     3170                3175                3180
621 Asn Val Gln Ser Tyr Ile Lys Ser Lys Asp Ser Gln Cys Ala Leu Glu
622 3185                3190                3195                3200
623 Leu Asn Asp Ile Asn Glu Ile Val Thr Gly Thr Lys Asn Asn Glu Asn
624                 3205                3210                3215
625 Asn Glu Phe Lys Glu Val Leu Lys Lys Leu Tyr Pro Gly Leu Tyr Phe
626             3220                3225                3230
```

RAW SEQUENCE LISTING DATE: 03/19/2002
PATENT APPLICATION: US/10/087,013 TIME: 16:16:07

Input Set : A:\NIH176.001C1.TXT
Output Set: N:\CRF3\03192002\J087013.raw

627 Val Glu Asp Glu Thr His Lys Asn His Val Leu Asp Gly Asn Ile Lys
628 3235 3240 3245
629 Glu Glu Glu Gln Thr Val Arg Pro Lys Ala Leu Tyr Phe Phe Thr Pro
630 3250 3255 3260
631 His Val Asp Ser Phe Tyr Gln Ala Pro Leu Phe Ser Thr His Arg Val
632 3265 3270 3275 3280
633 Ala Gln Tyr Asp Pro Lys Asn Asp Ile Leu Lys Ser Ser Ile Ser Val
634 3285 3290 3295
635 Val Ile Val Ser Ala Leu Gly Leu Ile Ala Leu His Phe Met Lys Lys
636 3300 3305 3310
637 Lys Phe Lys Ser Ser Val Asp Leu Leu Arg Ile Leu Asn Ile Pro Gln
638 3315 3320 3325
639 Gly Glu Tyr Gly Met Pro Thr Leu Glu Ser Lys Asn Arg Tyr Ile Pro
640 3330 3335 3340
641 Tyr Arg Ser Gly Pro Tyr Lys Gly Lys Thr Tyr Ile Tyr Met Glu Gly
642 3345 3350 3355 3360
643 Asp Thr Ser Gly Asp Glu Asp Lys Tyr Met Trp Asp Leu Ser Ser Ser
644 3365 3370 3375
645 Asp Ile Thr Ser Ser Glu Ser Glu Tyr Glu Glu Leu Asp Ile Asn Asp
646 3380 3385 3390
647 Ile Tyr Val Pro Gly Ser Pro Lys Tyr Lys Thr Leu Ile Glu Val Val
648 3395 3400 3405
649 Leu Glu Pro Ser Lys Arg Asp Ile Pro Ser Asp Asp Thr Pro Ser Asn
650 3410 3415 3420
651 Asp Thr Pro Arg Thr Asn Arg Phe Ile Asp Asp Glu Trp Asn Glu Leu
652 3425 3430 3435 3440
653 Lys His Asp Phe Val Ser Gln Tyr Leu Pro Asn Thr Glu Pro Asn Asn
654 3445 3450 3455
655 Asn Tyr Lys Ser Ala Asp Ile Pro Met Asn Thr Glu Pro Asn Thr Leu
656 3460 3465 3470
657 Tyr Ser Asp Asn Pro Glu Glu Lys Pro Phe Ile Ile Ser Ile His Asp
658 3475 3480 3485
659 Arg Asp Leu Tyr Thr Gly Lys Glu Ile Ser Tyr Asn Ile Asn Met Ser
660 3490 3495 3500
661 Thr Asn Thr Asn Asn Asp Ile Pro Met Asn Ala Arg Asn Asp Ser Tyr
E--> 662
3505 3510 3515 3520Arg Gly Ile Asp Leu Ile Asn Asp

664 <210> SEQ ID NO: 3
665 <211> LENGTH: 32
666 <212> TYPE: PRT
667 <213> ORGANISM: Plasmodium fallciparum
669 <400> SEQUENCE: 3
670 Glu Ala Glu Lys Glu Leu Lys Glu Gly Lys Ile Pro Glu Gly Phe Lys
E--> 671
1 5 10 15 Arg Gln Met Phe Tyr Thr Phe Gly

673 <210> SEQ ID NO: 4
674 <211> LENGTH: 10
675 <212> TYPE: PRT
676 <213> ORGANISM: Plasmodium falciparum
678 <400> SEQUENCE: 4
E--> 679 Lys Glu Leu Lys Glu Gly Lys Ile Pro Glu 1 5 10

RAW SEQUENCE LISTING DATE: 03/19/2002
PATENT APPLICATION: US/10/087,013 TIME: 16:16:07

Input Set : A:\NIH176.001C1.TXT
Output Set: N:\CRF3\03192002\J087013.raw

681 <210> SEQ ID NO: 5
682 <211> LENGTH: 4
683 <212> TYPE: PRT
684 <213> ORGANISM: Plasmodium falciparum
686 <400> SEQUENCE: 5
E--> 687 Lys Glu Gly Lys 1 hard return
689 <210> SEQ ID NO: 6
690 <211> LENGTH: 6
691 <212> TYPE: PRT
692 <213> ORGANISM: Plasmodium falciparum
694 <220> FEATURE:
695 <223> OTHER INFORMATION: misc_difference
697 <223> OTHER INFORMATION: misc_difference
699 <221> NAME/KEY: VARIANT
700 <222> LOCATION: (1)...(6)
701 <223> OTHER INFORMATION: Xaa = Any Amino Acid
703 <400> SEQUENCE: 6
E--> 704 Lys Xaa Asn Gly Xaa Asn 1 5
hard return

VERIFICATION SUMMARY DATE: 03/19/2002
PATENT APPLICATION: **US/10/087,013** TIME: 16:16:08

Input Set : **A:\NIH176.001C1.TXT**
Output Set: **N:\CRF3\03192002\J087013.raw**

L:22 M:270 C: Current Application Number differs, Replaced Current Application No
L:22 M:271 C: Current Filing Date differs, Replaced Current Filing Date
L:662 M:360 E: Sequence data overflow, line data truncated, for SEQ ID#:2
L:662 M:252 E: No. of Seq. differs, <211>LENGTH:Input:3542 Found:3520 SEQ:2
L:671 M:252 E: No. of Seq. differs, <211>LENGTH:Input:32 Found:16 SEQ:3
L:679 M:252 E: No. of Seq. differs, <211>LENGTH:Input:10 Found:0 SEQ:4
L:687 M:252 E: No. of Seq. differs, <211>LENGTH:Input:4 Found:0 SEQ:5
L:704 M:252 E: No. of Seq. differs, <211>LENGTH:Input:6 Found:0 SEQ:6